

**Work Order ID 122845**

July-29-14 2:03:20 PM

**\*122845\***

Page 1

Item ID: D212-664-201TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 7/29/14 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 8/15/14 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

Draw Nbr

Revision Nbr

D212-664-241

Rev

100

0.00

**\*100\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand &amp; install plugs DT8534 on both ends as per Folio FA114

2-Turn first side as per Folio FA114

3-Blend transition lines only, \*\*do not sand whole tube\*\*:

FOLIO REV: ADDWG REV: D

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

110

QC1- Inspect dimensions to dimension sheet

0.00

**\*110\***

QC

Memo

0.00

Quality Control

mmc  
14/08/04mmc  
14/08/04

# Work Order ID 122845

\*122845\*

Page 2

Item ID: D212-664-201TRN

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Item Name: Crosstube Turning Detail

Stop \*NS2\*

Start Date: 7/29/14 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 8/15/14 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start \*NR1\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

120

0.00

\*120\*

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA114

2-Blend transition lines only, \*\*do not sand whole tube\*\*:

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

FOLIO REV: AD

DWG REV: D

3-Remove sand and plugs

4- scribe batch # and part # as per dwg

1 / \$

man L  
14/08/05

130

QC1- Inspect dimensions to dimension sheet

0.00

\*130\*

QC

Memo

0.00

Quality Control

1 / \$

man L  
14/08/05



**Work Order ID 122845****\*122845\***

Page 3

Item ID: D212-664-201TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 7/29/14 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 8/15/14 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
140	QC8- Inspect parts - second check	0.00							
<b>*140*</b>									
QC	Memo	0.00							JW 14-08-06
Quality Control									
145		0.00							
<b>*145*</b>									
Crosstubes	Memo	0.00							JW 14-08-07
Crosstubes	GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.								
150		0.00							
<b>*150*</b>									
HandFXtube	Memo	0.00							① 14-8-8
Hand Finishing Crosstubes	1- PRESSURE WASH X-TUBE INSIDE AND OUT								DONS
	2- ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE								

# Work Order ID 122845

**\*122845\***

Page 4

July-29-14 2:03:21 PM

Item ID: D212-664-201TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 7/29/14 Start Qty: 1.00 **\*1\***

Cust Item ID:

Required Date: 8/15/14 Req'd Qty: 1.00 **\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160	QC5- Inspect part completeness to step on W/O	0.00							DAS 38 9-89
<b>*160*</b>									
QC	Memo	0.00							
Quality Control									
170		0.00							
<b>*170*</b>	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and stock in kanban rack								
	Location: <u>LG</u>								
180	QC21- Final Inspection - Work Order Release	0.00							
<b>*180*</b>									
QC	Memo	0.00							
Quality Control									

14/08/13

BL 14-08-13

MLJ 14-08-13

MLJ 14-08-13

# Picklist Print

July-29-14 2:03:20 PM

Page 1

Work Order ID: 122845

**\*122845\***

Parent Item: D212-664-201TRN

**\*D212-664-201TRN\***

Parent Item Name: Crosstube Turning Detail

Start Date: 7/29/14

Required Date: 8/15/14

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec  
IPP Rev B 08.04.02 Removed polish EC verified DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6006-129		Manufactured	No			120	Each	29.0000	1	1			

**\*D6006-129\***

Crosstube Material

**\*\***

Location

Loc Qty

Loc Code

LG003

29

103426

10

107875

18

75644

1

_____
_____
_____
_____

am L 14/07/31

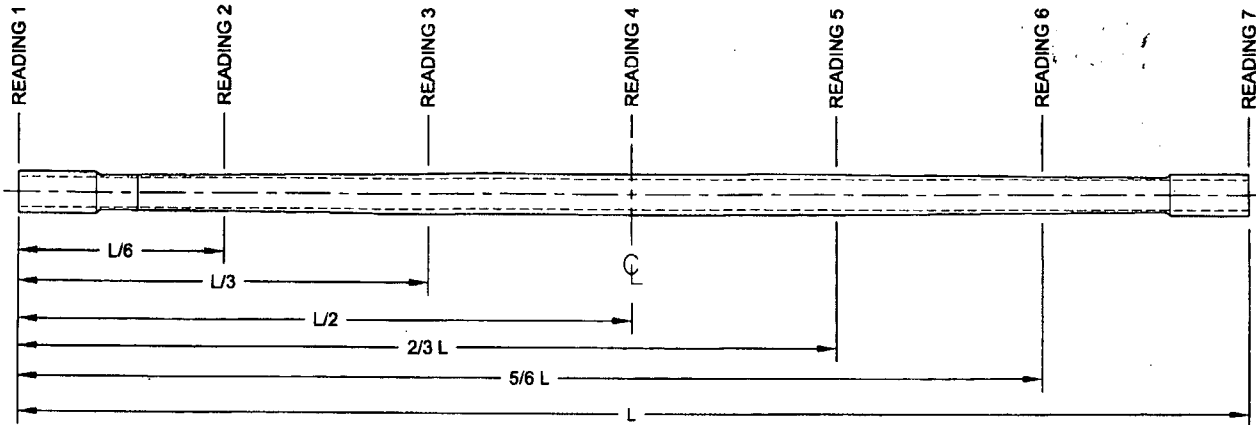
<b>DART AEROSPACE LTD</b>		<b>Work Order:</b> 122845
<b>Description:</b> Crosstube Assembly (205/212 High Aft)		<b>Part Number:</b> D212-664-241
<b>Inspection Dwg:</b> D212-664-241 <b>Rev:</b> <i>FE</i>		<b>Page 1 of 2</b>

### FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.200	+/-0.010	.200	/		vern	CNC-08
	R0.063	+/-0.010	.063	/		RG	
	2.990	+0.005/-0.000	2.990	/		vern	CNC-08
	5.237	+/-0.030	5.246	/			
	2.600	+0.005/-0.000	2.604	/			
	2.686	+0.005/-0.000	2.690	/			
	2.770	+0.005/-0.000	2.775	/			
	2.854	+0.005/-0.000	2.858	/			
	2.938	+0.005/-0.000	2.941	/			
	3.021	+0.005/-0.000	3.025	/		micr	CNC-05
	3.133	+0.005/-0.000	3.138	/			
	3.179	+0.005/-0.000	3.184	/			
SIDE B	0.200	+/-0.010	.200	/		vern	CNC-08
	R0.063	+/-0.010	.063	/		RG	
	2.990	+0.005/-0.000	2.990	/		vern	CNC-08
	5.237	+/-0.030	5.240	/			
	2.600	+0.005/-0.000	2.604	/			
	2.686	+0.005/-0.000	2.696	/			
	2.770	+0.005/-0.000	2.775	/			
	2.854	+0.005/-0.000	2.858	/			
	2.938	+0.005/-0.000	2.941	/			
	3.021	+0.005/-0.000	3.025	/		micr	CNC-05
	3.133	+0.005/-0.000	3.138	/			
	3.179	+0.005/-0.000	3.184	/			
	124.362	+/-0.020	124.360	/		tape	LG-11

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b> 172845
<b>Description:</b> Crosstube Assembly (205/212 High Aft)	<b>Part Number:</b> D212-664-241
<b>Inspection Dwg:</b> D212-664-241 <b>Rev:</b> D	<b>Page 2 of 2</b>

### WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation $\Delta w$ (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.402	.399	.388	.392	.014	0.062"
READING 2 L= 20.5	.311	.317	.312	.316	.006	
READING 3 L= 41.5	.478	.495	.492	.477	.018	
READING 4 L= 62	.519	.541	.529	.511	.030	
READING 5 L= 82.5	.487	.502	.494	.476	.026	
READING 6 L= 103.5	.319	.314	.314	.317	.005	
READING 7 L= 124.362	.387	.392	.403	.391	.016	

#### Calibration Result

Actual Block Thickness: 100 - 750

Sitescan 250 Measured Thickness: 100 - 750

<b>Measured by:</b> <i>mmc</i>
<b>Date:</b> 14/08/06

<b>Audited by:</b> <i>JW</i>
<b>Date:</b> 14-08-06

<b>Preliminary Approval:</b>
<b>Date:</b>

Rev	Date	Change	Revised by	Approved
A	05.04.27	New Issue (P/O D412-664-201)	KJ/JLM	
B	06.03.09	Tolerance for 5.237 was +/-0.001	KJ/JLM	
C	07.05.08	Dwg Rev. updated	KJ/JLM	
D	10.08.03	Dimension 124.362 was 124.36	KJ	
E	12.06.04	Wall thickness form added	KJ	<i>[Signature]</i>



Item	Qty -241	Qty -241B	Part Number	Description
1	X		D212-664-241	CROSSTUBE ASSEMBLY (205/212 HIGH AFT)
2		X	D212-664-241B	CROSSTUBE ASSEMBLY (214 HIGH AFT)
3	1	1	D6006-129	CROSSTUBE
4	2		D2940-1	SUPPORT
5	4	4	D3595-063-530	RUBBER CUSHION
6		2	D5018-1	SUPPORT
7	4	4	MS21920-28	CLAMP (OR MS21920-30)
8	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

#### GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6006-129  
FINISHED LENGTH = 124.362±0.020
- FINISH: a) CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
b) PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
c) MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2 / C6-3, HATCHED AREA)  
d) PAINT OUTSIDE PER DART QSI 005 4.2  
e) REMOVE MASKING AND APPLY MATTE CLEAR COAT
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: D212-664-241/-241B = 44.2 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

#### MACHINING

- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.

#### BENDING

- BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7.2% (BASED ON O.D.) IN LOWER HALF OF R35.5 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.

#### ASSEMBLY

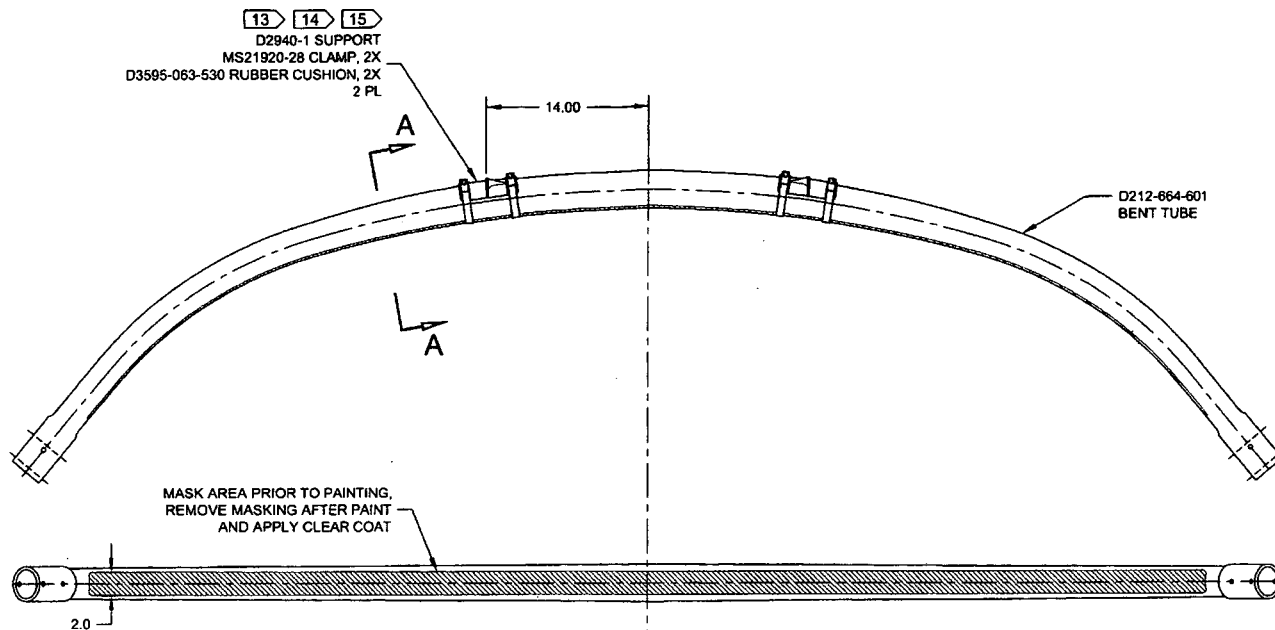
- INSTALL D2940-1 / D5018-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- INSTALL MS21920-28 CLAMPS (OR -30) WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

E	D5018-1 WAS D2940-1 (-241B), PROSEAL WAS MAGNOBOND. NOTE 2: ADD INSPECTION WINDOW, NOTE 11: ALLOW 7.2% CRUSH. NOTE 15: ADD 72HR CURE AND RETORQUE FOR PROSEAL. ADD SHEET 3, CLAMPS REVERSED TO PREVENT CHAFING (ZN B7-2, B7-3), BEND HEIGHT TOL. NOW 0.25 WAS 0.13 (C1-4), INCORP DEO D-1/-2	CP	14.04.01
D	REFORMAT/REVISE GENERAL NOTES/PART LIST: REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -241B (ZN D4-2, B4-2); REMOVED REF & ADD TOLERANCES (ZN D8-3 & C4-3, C6-3 & A8-3); RELOCATED FLAG #6 PER PAR 08-048 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4	RF	09.09.30
C	REMOVE -1008 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	PH	07.03.08
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	CP	00.12.12
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	14.04.01		

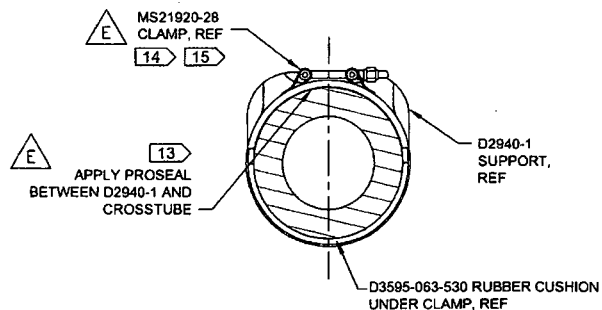
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D212-664-241	REV. E SHEET 1 OF 5
TITLE CROSSTUBE ASSY (205/212 HI AFT)	SCALE NTS

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RELEASED  
2014-05-26



**D212-664-241  
ASSEMBLY DETAIL**



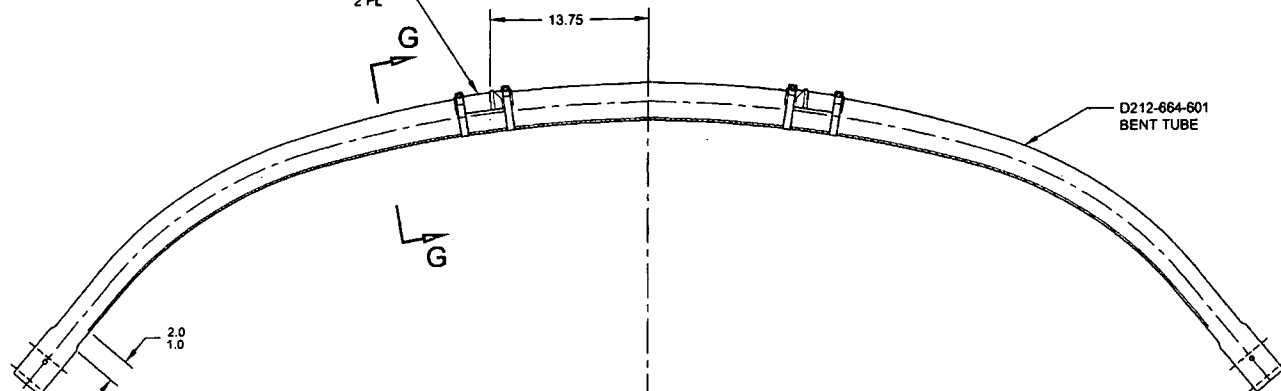
**SECTION A-A  
SCALE 4X**

RELEASED  
2014-05-26

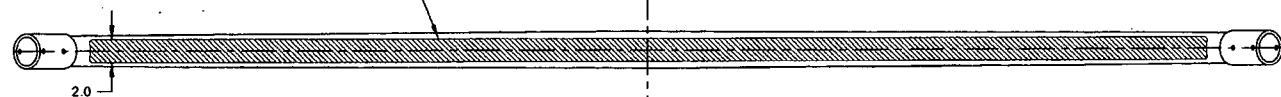
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DRAWN	Q	HAWKESBURY, ONTARIO, CANADA	
CHECKED	DL	DRAWING NO.	REV. E
MFG. APPR.	NS	D212-664-241	SHEET 2 OF 5
APPROVED	NS	TITLE	SCALE
DE APPR.	H	CROSSTUBE ASS'Y (205/212 HI AFT)	NTS
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8 7 6 5 4 3 2 1

**E** **13** **14** **15**  
D5018-1 SUPPORT  
MS21920-28 CLAMP, 2X  
D3595-063-530 RUBBER CUSHION, 2X  
2 PL



MASK AREA PRIOR TO PAINTING,  
REMOVE MASKING AFTER PAINT  
AND APPLY CLEAR COAT



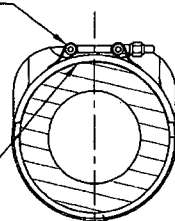
**C**  
SYM

**D212-664-241B**  
**ASSEMBLY DETAIL**

**E**

**E** MS21920-28  
CLAMP, REF  
**14** **15**

**E** **13**  
APPLY PROSEAL  
BETWEEN D5018-1 AND  
CROSSTUBE



**E** D5018-1  
SUPPORT,  
REF

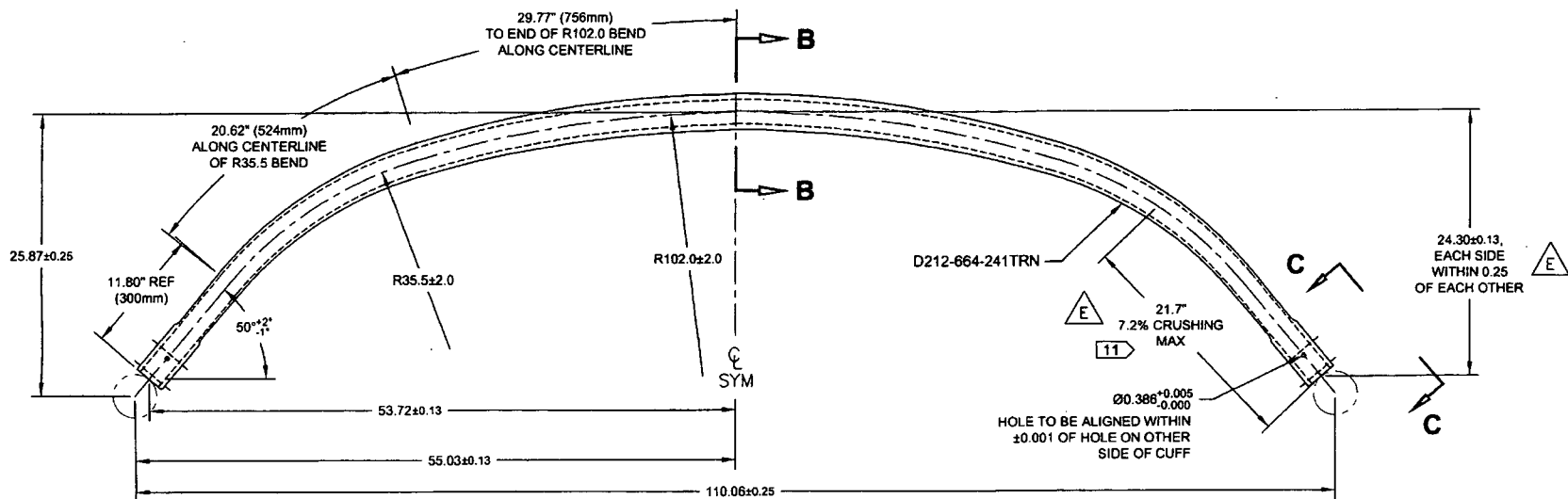
D3595-063-530 RUBBER CUSHION  
UNDER CLAMP, REF

**SECTION G-G**  
SCALE 4X

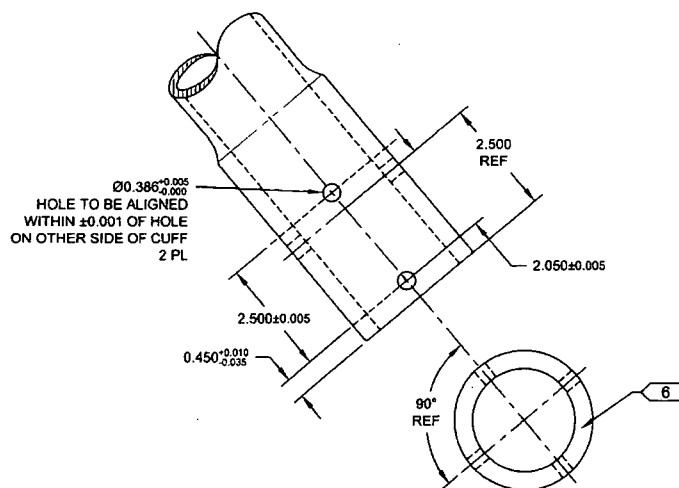
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2014-05-26

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CHECKED	DW	DRAWING NO.	REV. E
MFG. APPR.	SD	D212-664-241	SHEET 3 OF 5
APPROVED	TH	TITLE	SCALE
DE APPR.	TH	CROSSTUBE ASS'Y (205/212 HI AFT)	NTS
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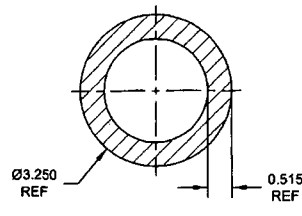
8 7 6 5 4 3 2 1



**D212-664-601** 11  
**BENDING AND DRILLING DETAIL**



**VIEW C-C: CUFF DETAIL**  
 SCALE 3X



**SECTION B-B**  
 SCALE 4X

**RELEASED**  
 2014-05-26  
 JMD

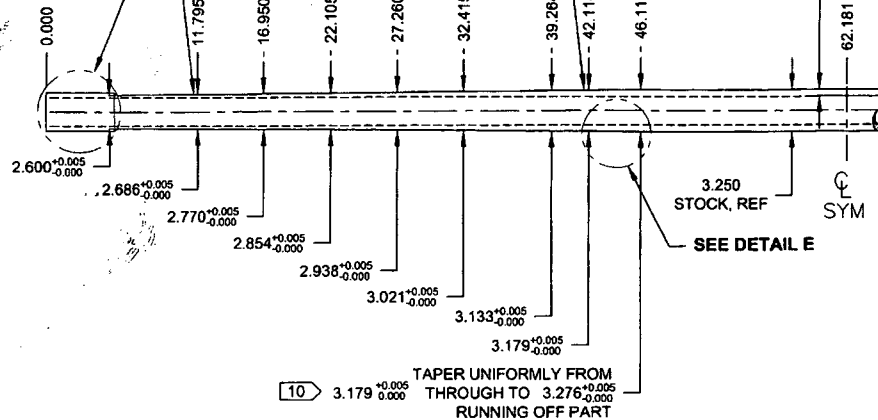
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CHECKED	DL	DRAWING NO.	REV. E
MFG. APPR.	AN	D212-664-241	SHEET 4 OF 5
APPROVED	AN	TITLE	SCALE
DE APPR.	AN	CROSSTUBE ASS'Y (205/212 HI AFT)	NTS
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R100.0 TRANSITION  
BETWEEN TAPERED  
SECTIONS

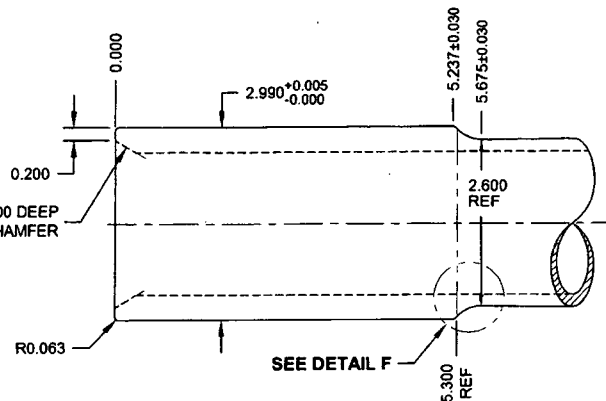
R100.0 TRANSITION  
BETWEEN TAPERED  
SECTIONS

0.515 WALL  
STOCK, REF

SEE DETAIL D

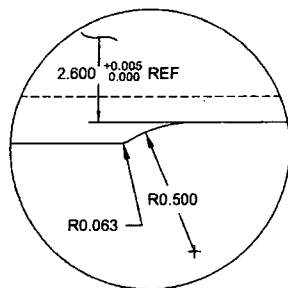


10  
30° X 0.500 DEEP  
CHAMFER

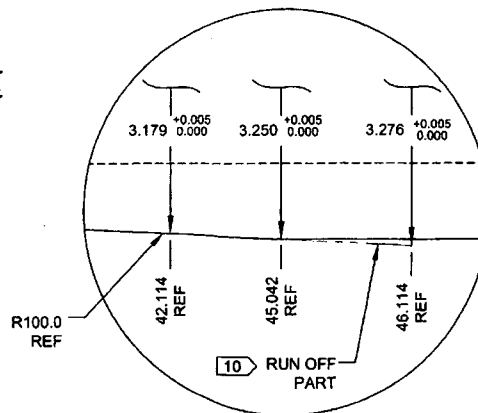


**DETAIL D:**  
**CROSSTUBE CUFF**  
SCALE 5X

**D212-664-241TRN**  
**TURNING DETAIL**



**DETAIL F:**  
**CUFF TRANSITION**  
SCALE 10X



**DETAIL E:**  
**TAPER RUN-OFF**  
NOT TO SCALE

**RELEASED**  
2014-05-26

DESIGN	90	<b>DART AEROSPACE LTD</b>	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	SW	DRAWING NO.	REV. E
MFG. APPR.		D212-664-241	SHEET 5 OF 5
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASS'Y (205/212 HI AFT)	NTS
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